

IN THE CLAIMS

Presented below are the claims, including amended claims and claims not amended, in a clean, unmarked format. Claims 1, 17, and 18 have been amended. New claim 20 has been added. For the convenience of the Examiner, all of the pending claims are set forth below.

01 1. (Amended) A method comprising:

configuring a circuit emulation service (CES) over an internet protocol (IP) network based on properties of the IP network, the CES being configured to establish a tunnel between a local interworking function and a remote interworking function;


encapsulating data received at a constant bit rate at the local interworking function into a plurality of IP packets configured according to the CES, wherein the plurality of IP packets includes a first IP packet having a variable length; and

transporting the IP packets from the local interworking function to the remote interworking function according to the CES.

2. The method of claim 1 wherein the properties of the IP network comprise at least one of a maximum delay variation, a bit error rate, out-of-order IP packet delivery, and an unpredictable packet loss rate.
3. The method of claim 1 wherein the tunnel is established to carry the plurality of IP packets between the local and remote interworking functions.
4. The method of claim 1 wherein the tunnel comprises a layer 2 tunneling protocol (L2TP) tunnel and L2TP tunnel session within the L2TP tunnel.

5. The method of claim 1 wherein the tunnel comprises a multi-protocol label switching (MPLS) tunnel.
6. The method of claim 1 wherein configuring the CES comprises:
exchanging a plurality of CES control protocol (CESCP) information between the local interworking function and the remote interworking function.
7. The method of claim 6 wherein the plurality CESCP information comprises at least one of a circuit identification and an internet protocol address for the local and remote interworking functions, alarm indication signal options, idle condition options, a clock option, a check sum option, a minimum and a maximum circuit size, a multiple circuits option, a maximum transition delay, a maximum delay variation, a compression option, and an encryption option.
8. The method of claim 1 wherein encapsulating the data comprises attaching a CES header to each IP packet.
9. The method of claim 8 wherein the CES header comprises a version number for compatibility between the local interworking function and the remote interworking function.
10. The method of claim 1 further comprising:
buffering the plurality of IP packets received from the remote interworking function for at least as long as a maximum delay variation; and
outputting payloads of the plurality of received IP packets at the constant bit rate.

11. The method of claim 10 wherein the maximum delay variation comprises delay due to out-of-order IP packet delivery.
12. The method of claim 1 wherein each IP packet further comprises at least one circuit, each circuit comprising at least one circuit header.
13. The method of claim 12 wherein the at least one circuit header comprises at least one of a circuit identification, a flag field, a sequence number, a first octet padding value, a last octet padding value, and a data field.
14. The method of claim 13 wherein the flag field comprises at least one of a compression flag, an idle flag, an alarm indication signal flag, and a clocking information flag.
15. The method of claim 14 wherein the clocking information flag comprises a synchronous residual time stamp (SRTS) value.
16. The method of claim 13 wherein the sequence number indicates a starting position of a first bit of data in a corresponding circuit with respect to a reference point in a corresponding bit stream.

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17. (Amended) An article of manufacture comprising:
-  a machine readable storage medium having stored thereon a plurality machine executable instructions; and
- said instructions, when executed, to implement a method comprising

configuring a circuit emulation service (CES) over an internet protocol (IP) network based on properties of the IP network, the CES being configured to establish a tunnel between a local interworking function and a remote interworking function;

encapsulating data received at a constant bit rate at the local interworking function into a plurality of IP packets configured according to the CES, wherein the plurality of IP packets includes a first IP packet having a variable length; and

transporting the IP packets from the local interworking function to the remote interworking function according to the CES.

18. (Amended) An apparatus comprising:

first circuitry to configure a circuit emulation service (CES) over an internet protocol (IP) network based on properties of the IP network, the CES being configured to establish a tunnel between a local interworking function and a remote interworking function;

second circuitry to encapsulate data received at a constant bit rate at the local interworking function into a plurality of IP packets configured according to the CES, wherein the plurality of IP packets includes a first IP packet having a variable length; and

third circuitry to transport the IP packets from the local interworking function to the remote interworking function according to the CES.

19. A method, comprising:

configuring a circuit emulation service (CES) over an internet protocol (IP) network based on properties of the IP network, the CES being configured between a first interworking function to a second interworking function;

encapsulating data received at a constant bit rate at the first interworking function into a first plurality of IP packets configured according to the CES;

encapsulating data received at the constant bit rate at the second interworking function into a second plurality of IP packets configured according to the CES;

transporting the first plurality of IP packets from the first interworking function to the second interworking function according to the CES;

transporting the second plurality of IP packets from the second interworking function to the first interworking function according to the CES;

buffering the second plurality of IP packets at the first interworking function for at least as long as a maximum delay variation, said maximum delay variation comprising delay due to out-of-order IP packet delivery;

outputting payloads of the second plurality of IP packets at the constant bit rate;

buffering the first plurality of IP packets at the second interworking function for at least as long as the maximum delay variation; and

outputting payloads of the first plurality of IP packets at the constant bit rate.

20. (New) An apparatus, comprising:

means for configuring a circuit emulation service (CES) over an internet protocol (IP) network based on properties of the IP network, the CES being configured between a first interworking function to a second interworking function;

means for encapsulating data received at a constant bit rate at the first interworking function into a first plurality of IP packets configured according to the CES;

means for encapsulating data received at the constant bit rate at the second interworking function into a second plurality of IP packets configured according to the CES;

means for transporting the first plurality of IP packets from the first interworking function to the second interworking function according to the CES;

means for transporting the second plurality of IP packets from the second interworking function to the first interworking function according to the CES;

means for buffering the second plurality of IP packets at the first interworking function for at least as long as a maximum delay variation, said maximum delay variation comprising delay due to out-of-order IP packet delivery;

means for outputting payloads of the second plurality of IP packets at the constant bit rate;

means for buffering the first plurality of IP packets at the second interworking function for at least as long as the maximum delay variation; and

means for outputting payloads of the first plurality of IP packets at the constant bit rate.
